BOYS' HIGH SCHOOL AND COLLEGE
FIRST TERM EXAMINATION (2024-25)
CLASS - X
CHEMISTRY
Science Paper-2

(Two hours)

Section A is compulsory. Attempt **any four** questions from Section II. The intended marks for questions or parts of questions are given in brackets [ ].

Section A (40 marks)

Attempt **all** questions from this section

Question 1 Choose **one** correct answer to the questions given from the given options: [15]

(i) A compound **P** is heated in a test tube with sodium hydroxide solution. A red litmus paper held at the mouth of the test tube turns blue. Which of the following could compound **P** be?
(a) Zinc sulphate
(b) Copper sulphate
(c) Ferrous sulphate
(d) Ammonium sulphate

(ii) The basicity of acetic acid is:
(a) 1
(b) 2
(c) 3
(d) 4

(iii) $A \longrightarrow A^{3+}$; $B \longrightarrow B^{1-}$
The number of electrons present in the outermost shell of atoms A and B, respectively are:
(a) 5, 1
(b) 3, 1
(c) 3, 7
(d) 5, 7

(iv) The process of electrolysis is an example of:
(a) Oxidation reaction
(b) Reduction reaction
(c) Redox reaction
(d) Displacement reaction

(v) Elements P, Q, R, S have atomic numbers 7, 15,18, and 19 respectively. Which two elements will have similar chemical properties:
(a) Q & R
(b) R & S
(c) P & S
(d) P & Q

(vi) In the third period, Argon has maximum Ionisation Potential because:
(a) it easily accepts electrons
(b) it easily loses electrons
(c) its outermost shell is completely filled
(d) it has an unstable electronic configuration

(vii) In a molecule of water, the oxygen atom has:
(a) one shared pair of electrons
(b) two lone pair of electrons
(c) one lone pair of electrons
(d) three shared pair of electrons

(viii) The metal hydroxide which reacts with both acids and alkalis to form salt and water is:
(a) Calcium hydroxide
(b) Magnesium hydroxide
(c) Zinc hydroxide
(d) Ferric hydroxide

(ix) A dibasic acid:
(a) Hydrochloric acid
(b) Sulphuric acid
(c) Phosphoric acid
(d) Nitric acid

(x) The method of preparation of Zinc (II) sulphate:
(a) Neutralization
(b) Direct Combination
(c) Precipitation
(d) Simple displacement

(xi) A pale blue precipitate is obtained upon treating an aqueous solution salt **Q** with ammonium hydroxide. The precipitate dissolves in excess alkali to give a deep blue solution. The cation in the salt **Q** is:
(a) Cu^{1+}
(b) Cu^{2+}
(c) Fe^{2+}
(d) Fe^{3+}

(xii) Copper, Zinc and Tin are the metals alloyed to form:
(a) Duralumin
(b) Brass
(c) Bronze
(d) Solder

(xiii) The ion that will get discharged with greatest difficulty from aqueous mixture of anions listed below:
(a) SO_4^{2-}
(b) OH^-
(c) NO^{3-}
(d) Cl^-

(xiv) A particular solution contains molecules and ions of the solute, so it is a:
(a) weak acid
(b) strong acid
(c) strong base
(d) aqueous solution of sodium chloride

(xv) With reference to the variation of properties in the periodic table, which of the following is generally true?
(a) Atomic size increases from left to right across a period
(b) Ionisation potential increases from left or right across a period
(c) Electron affinity increases going down a group
(d) Electronegativity increases going down a group

Question 2

(i) The elements of one short period of the periodic table are given below in the: [5]
Li, Be, B, C, O, F, Ne

(a) To which period do these elements belong?
(b) One element of this period is missing. Which is it and where should it be placed?
(c) Which one of these elements does not form any compounds?
(d) Place the three elements fluorine, beryllium and oxygen in the order of increasing electronegativity.
(e) Which one of the above elements belongs to the halogen series?

(ii) [5]

(a) By drawing an electron dot diagram, show the formation of ammonia molecule.
[Atomic number, N = 7 and H = 1]
State the type of bond present in it.

(b) State the observation when:
1. dilute HCl is added to zinc sulphide solution
2. barium chloride solution is mixed with sodium sulphate solution.

(iii) Mr. Gupta wants to electroplate his key chain with nickel, to prevent rusting. [5]
For this electroplating:
(a) Name the electrolyte.
(b) Name the cathode
(c) Name the anode
(d) Give the reaction at the cathode
(e) Give the reaction at the anode

(iv) [5]
(a) Differentiate between Calcination and Roasting
(b) Write the name and chemical formula of the main ore of aluminium
(c) Name the alloy used for making aircrafts.
(d) What is Anode mud?

(v) Match the salts given in **Column A** with their method of preparation given in **Column B** [5]

Column A	Column B
i) $FeCl_3$ from Fe and Cl_2	a). Neutralisation of insoluble base
ii) $FeSO_4$ from Fe and dil. H_2SO_4	b). Neutralisation of an alkali with dil. acid
iii) $CaCO_3$ from $CaCl_2$ and Na_2CO_3	c). Simple displacement
iv) Na_2SO_4 from NaOH and dil. H_2SO_4	d). Direct combination
v) $CuSO_4$ from $CuCO_3$ and dil. H_2SO_4	e). Double decomposition (precipitation)

Section B (40 Marks)

Attempt any **FOUR** questions from this section

Question 3

(i) Mention any two uses of Stainless steel. [2]

(ii) Name: [2]
a). A compound added to lower the fusion temperature of alumina in the extraction of aluminium.
b). The ore of zinc containing its sulphide.

(iii) An element of Z has atomic number 16. Answer the following questions on Z [3]
a). State the period and group to which Z belongs.
b). Is Z a metal or a non-metal?

(iv) Give a chemical term for the following: [3]
(a) A bond formed by a shared pair of electrons with both electrons coming from the same atom.
(b) The ions that do not take part in the electrolytic reaction.
(c) The process of separation of ions which are already present in an ionic compound.

Question 4

(i) Explain why solid sodium chloride does not allow electricity to pass through. [2]

(ii) Draw an electron dot diagram to show the formation of Magnesium chloride. [2]

(iii) (a) The electronic configuration of oxygen is 2,6. How many electrons, in the outer shell of oxygen atom, are not involved in the formation of an oxygen molecule? [3]
(b) Give one word or phrase for "the amount of energy required to remove an electron from an atom to convert it into a positively charged ion."
(c) Give a suitable chemical term for a salt formed by partial replacement of the ionizable hydrogen atoms of an acid by a metallic or ammonium ion.

(iv) Categorise the following as Strong electrolyte, Weak electrolyte, Non-electrolyte [3]
a). Benzene
b). Sulphuric acid
c). Ammonium hydroxide

Question 5

(i) Explain why the size of the atom of inert gas is bigger than the size of the halogen of the same period (Note: atomic size decreases from left to right across a period). [2]

(ii) Identify the cation in the following two metallic salts: [2]
(a) When the metallic salt solution is treated with NaOH solution, a dirty green precipitate is obtained that is insoluble in excess of alkali.
(b) When the metallic salt solution is treated with either NaOH solution or NH_4OH solution, a gelatinous white precipitate is obtained that is soluble in excess of alkali.

(iii) X (2,8,7) and Y (2,8,2) are two elements. Using this information complete the following: [3]

(a) _____ is the metallic element.

(b) Metal atoms tend to have a maximum of _____ electrons in the outermost orbit.

(c) _____ is a reducing agent.

(iv) Mohan has three solutions **A**, **B** and **C** having pH 13, 5 and 2, respectively. Which Of the above solutions **A**, **B** or **C**: [3]

(a) will react with Magnesium to liberate hydrogen gas.

(b) will liberate ammonia gas when it reacts with ammonium chloride.

(c) will contain molecules as well as ions.

Question 6

(i) Define the terms: [2]

(a) Normal salt

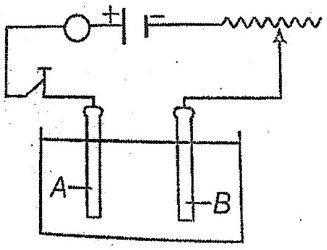
(b) Electrode

(ii) Select the ion, in each case, that will get selectively discharged from the aqueous mixture of the ions listed below: [2]

(a) Pb^{2+}, Cu^{2+}, Ag^{+}

(b) NO^{3-}, OH^{-}, Cl^{-}.

(iii) Study the diagram given below and answer the questions that follow: [3]



a). Give the names of the electrodes A and B.

b). Which electrode is the oxidizing electrode?

c). What will be the product formed at electrode A during electrolysis of molten Lead bromide?

(iv) Answer the following questions with respect to electrorefining of copper: [3]

a) What is the electrolyte used?

b) During the process of electrorefining, while the cathode becomes thicker and thicker, the anode gradually finishes. Explain.

Question 7

(i) Explain why ionic compounds have high melting and boiling points. [2]

(ii) Differentiate between non-polar and polar covalent compounds with an appropriate an example in each category. [2]

(iii) [3]

(a) What is lone pair effect?

(b) Draw the electron dot diagram of ammonium ion.

(c) Name the donor and acceptor atoms of the coordinate bond present in ammonium ion.

(iv) (a)State the number of elements in period 1, period 2 and period 3 of the periodic table. [3]

(b) Name the elements in period 1.

(c) What happens to the chemical reactivity of elements on moving from left to right in a period?

Question 8

(i) Electron affinity (E.A.) decreases down a group. But as an exception oxygen has lower E.A. than sulphur in group 16 and fluorine has lower E.A. than chlorine in group 17. Explain why. [2]

(ii) Name the products formed at cathode and anode during electrolysis of acidulated water. [2]

(iii) [3]

a) Why is silver nitrate solution not directly used during electroplating with silver?

b) Name the electrolyte used, in place of silver nitrate, in the above electroplating.

c) What is the cathode in the above process?

(iv) [3]

a) Name the process used for electrolytic reduction of alumina to aluminium metal.

b) In the above process, what are the components of the electrolytic mixture besides alumina?

c). Why is powdered coke sprinkled over the above electrolytic mixture?

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